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CURRENT LITERATURE

BOOK REVIEWS

Die Kultur der Gegenwart

During the past twenty years no botanist has appeared oftener in our "book reviews" and "notes for students" than EDUARD STRASBURGER. It is with a keen sense of loss that we write this final review.[1] In the spring of 1911 STRASBURGER wrote to the reviewer: "A year ago I felt compelled to participate in a work of great scope under the title of *Kultur der Gegenwart*, which is to present in accessible form the entire field of science. The object may be good in itself, but I have often regretted that I undertook the work and that I must devote to it, rather than to my research, the few years of scientific activity which still remain for me. I have not felt well the past winter, but nevertheless have had to work hard." About this time he wrote to TISCHLER that he was devoting eight hours a day to the work. The day before he died the manuscript was completed, and he also added the finishing touches to the manuscript for the third edition of his *Streifzüge an der Riviera*. With these two tasks out of the way, he was eagerly planning to take up his interrupted research, but his contribution to the *Kultur der Gegenwart* was destined to be his last.

The *Kultur der Gegenwart* is a work of even greater scope than STRASBURGER'S letter indicated, for it embraces not only the sciences, but also philosophy, law, history, and literature. Some of the titles, like "The religion of the orient," "The history of philosophy," "The Greek language and literature," "The history of law," "Mathematics in ancient and mediaeval times," "Chemistry," "Astronomy," "The transformation of energy," "Anthropology," "Mountain structure," "The technic of war," will give some idea of the range of knowledge one should possess if he is to be regarded as a man of culture at the present time. The entire work comprises 61 volumes. The present review deals only with Vol. 2 of the fourth section of the third subdivision, or III Teil, IV Abteil, Band 2. This method of designating volumes may be very clear to the German mind, but, like the endless "Teil" and "Abteil" of the *Pflanzenfamilien*, it is confusing to the American. We should have marked the present contribution Vol. 36, which seems to be its position in the series of 61 volumes. In this volume there are two sections: "The plant cell and tissues" by STRASBURGER, and "Morphology and development of plants" by BENECKE. The two contributions will be considered separately.

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[1] Die Kultur der Gegenwart. Teil III. Abt. IV. STRASBURGER, EDUARD, Zellen und Gewebelehre; und BENECKE, W., Morphologie und Entwickelungsgeschichte. 8vo. pp. vi+338. Leipzig: Teubner. 1913. *M* 14.

THE PLANT CELL AND TISSUES.—The title is broad enough to cover most of the fields now designated as cytology and morphology. Some of the topics are: cell contents, cell membranes, nuclear and cell division, reduction of chromosomes, fertilization, alternation of generations, origin of tissues from apical cells and from meristem, differentiation of tissues, etc. Throughout the work the cell and tissues are treated not only from the standpoint of structure, development, and phylogeny, but also from the standpoint of chemical composition and function. While both vegetative and reduction mitoses are rather minutely described, little attention is given to conflicting theories. The main facts stand in bold relief, without those obscuring details which vary in different forms, or which may be present in some plants and lacking in others. In the treatment of mitosis, the chromosome is regarded as an individual organ. In the description of fertilization, the nucleus is regarded as the sole bearer of hereditary characters, so far as heredity is concerned, the cytoplasm being only the necessary medium in which the nucleus exercises its functions. Alternation of generations, of course, is regarded as antithetic; alternation is recognized in animals as well as in plants, in both cases the two generations being distinguished by the haploid and diploid number of chromosomes, a position with which the reviewer is in the heartiest accord. The origin of tissues from apical cells or meristem and the differentiation of cells into vessels, sieve tubes, sclerotic cells, glandular hairs, etc., is followed in many cases.

The work, as indicated by STRASBURGER'S own words, was not intended as a piece of research. The object was to make such a presentation of the cell and tissues as a man of culture, although not a professional botanist, might read with profit. It can be said, without the slightest hesitation, that even the professional botanist can read it with profit, for it covers most of the field of cytology and morphology, and presents the views of one who speaks from an abundance of first-hand knowledge and who has contributed more to the subject than any other man of his generation. While the reading may be rather difficult for the average man who regards himself as cultured, it is hard to see where it could have been simplified. Such a presentation was no new experience for STRASBURGER, since he had for many years given his weekly Friday lecture to the people of Bonn. These lectures brought fundamental botanical problems within the reach of those who were interested enough to attend. The style is much simpler than STRASBURGER used in publishing his researches. This is seen particularly in the shorter sentences and in the comparative scarcity of technical terms. To the cytologist, the book is full of suggestions for research.

MORPHOLOGY AND DEVELOPMENT OF PLANTS.—The field left for BENECKE'S contribution, after the broad presentation by STRASBURGER, would seem rather limited. The subject is treated under two subdivisions: (1) general, and (2) special. The first is devoted largely to a consideration of the form and function of the root, stem, and leaf, comparatively little attention being given to reproductive structures, because vegetative structures can be presented without all sorts of details, and because reproductive structures lead so easily to general questions and plant systems. GOETH's theory of metamorphosis is presented and a modified view of this theory seems to dominate the discussion. This general part occupies only 31 pages.

The second, or special part, presents the various groups from the algae up to the flowering plants, and occupies 120 pages. The reading should not be very difficult for an educated man, interested in botany, but not a professional botanist. The technical terms, especially those used in describing flowering plants, are rather numerous.—CHARLES J. CHAMBERLAIN.

NOTES FOR STUDENTS

Recent work on tropisms.—For orthotropic organs FITTING and others have proved that geo-excitation increases with the sine of the angle of displacement from the normal or labile rest position. Therefore, the horizontal position gives maximum stimulation, and all equal displacements below and above it equal stimulation. NOACK asserts that this physiological response does not parallel any known change in the energy of gravity itself with variation of the angle, and is not capable of direct physical explanation.

NOACK[2] inquires whether photo-excitation of orthotropic organs obeys the sine of angle law. Assuming constant source of unilateral light, the intensity falling on a given surface of the plant organ varies as the cosine of the angle of deviation from the perpendicular, or as the sine of the angle of deviation from the rest positions. On the basis of light intensity, therefore, one might expect the sine law to hold. NOACK finds, however, that intensity of the illumination of the flank of the organ is not the sole factor, but the direction of the striking rays is important, hence the sine law does not apply. He studied chiefly the coleoptile of *Avena*. The following table shows the "Schwelle" (product of light intensity in candle-power actually falling on the illuminated surface of the organ by least time in seconds necessary to give a final response in 50 per cent of the organs) and presentation time under constant light source for the various angles of deviation from the normal rest position.

Angle	15°	30°	45°	65°	90°	105°	120°	135°	150°
Schwelle	7.3	9.5	11.9	11.18	12.2	15.8	20.3	23.7	32.4 (C.M.S.)
Presentation time	28.2	19.0	16.8	12.9	12.2	16.4	23.6	33.5	64.8

The "Schwelle" for the different angles shows the organ is more sensitive to impinging light from above than from below the horizontal, and that this sensitiveness increases continuously from the inverse to the normal rest position. This increase follows a regular law, as is shown by the fact that the product of

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[2] NOACK, KONRAD, Die Bedeutung der schiefen Lichtrichtung für die Helioperzeption parallelotroper Organe. Zeitschr. Bot. **6**:1–79. 1914.